JRSSEM 2023, Vol. 03, No. 06, 1418 – 1426
E-ISSN: 2807 - 6311, P-ISSN: 2807 - 6494

JRSSEM
JOURNAL RESEARCH OF SOCIAL SCIENCE, ECONOMICS, AND MANAGEMENT

THE SELECTION OF WEAPON SYSTEMS IN THE A2/AD (ANTI ACCESS/AREA DENIAL) STRATEGY AT INDONESIA'S STRATEGIC CHOKE POINTS BY USING THE ANALYTICAL HIERARCHY PROCESS (AHP) METHOD

Tri Yudha Ismanto[1]
Fathurrohman Umar[2]
Setyanggono Eko Lutvie[3]
Udayana Agung[4]
Prasetyo Hari[5]
Midhio I Wayan[6]
Yusgiantoro Purnomo[7]
The Republic of Indonesia Defense University, Indonesia
*Corresponding Author E-mail: tri.ismanto@doktoral.idu.ac.id

ABSTRACT: This article utilizes the Analytical Hierarchy Process (AHP) method to decide how to choose an effective weapon system for the A2/AD (anti-access/area denial) strategy at the Sunda Strait, Indonesia's strategic choke point. The main discussion is limited to selecting the types of weapon systems considered effective in implementing A2/AD at Indonesia's strategic choke points. The next step is to decide which primary, secondary, and alternative criteria are the most important. Each of these will then be put together mathematically by measuring consistency using the Consistency Index (CI), the Consistency Ratio (CR), and the Consistency Hierarchy, which is the ranking as the result of the analysis. This method resulting in a weight for the navigation criteria of 66%, projection of 19%, and operability of 16%. Furthermore, in conclusion, the order of the best weapon systems is RBS15 MK4 with a weight of 66%, Brahmos II at 18%, and Neptune 360ST at 16%.

Keywords: Weapon Systems, Selection, Indonesia, A2/AD strategy, Choke Points, Analytical Hierarchy Process (AHP)

INTRODUCTION

The selection of *weapon systems* at choke *points* for A2/AD (*Anti Access/Area Denial*) strategies is very important because it can affect the ability to maintain security and defense of strategic areas (Satriananda & Manfaat, 2015). The A2/AD (*Anti Access/Area Denial*) strategy is a military approach that aims to deter or impede enemy access to a specific area or areas (Russell, 2017). This strategy is designed to reduce the enemy's ability to operate or enter certain territory by using a combination of defensive and offensive tactics. It includes the use of various defensive weapon systems such as anti-ship missiles, surface-to-air missiles, surface-to-surface missiles, sea mines, air defense systems, and coastal defense systems.

The main objective of the A2/AD strategy is to maximize the geographical and technological advantages of those defending the region (Dobija, 2021). For example, Indonesia's strategic *choke points* are the Sunda Strait, Makassar Strait, Lombok Strait, and other straits which are the Indonesian Archipelago Sea Channel (ALKI). In addition, one of the objectives of the A2/AD strategy is also, in addition to preventing the choke point area from being used by irresponsible parties, also to provide a sense of security to shipping users so that the wheels of the Indonesian economy continue to run.

Indonesia as an archipelagic country certainly has waters where there are strategic points or *choke points* that can be a threat if exploited by foreign powers. So that the *choke point* becomes a key terrain that must be occupied and controlled by Indonesia. Indonesian Minister of Defense Prabowo Subianto initiated the implementation of the A2/AD strategy by issuing Minister of Defense Regulation No. 14 of 2023 concerning the State Defense Policy Strategy for 2023 with the aim of realizing defense strengthening in Indonesia's *strategic* choke point area (Peraturan.go.id, 2023).

The document explains that there are nine (9) strategic *choke points which are* trade routes that are widely used by international commercial fleets which are also the Indonesian Archipelago Sea Channel (ALKI) (Figure 1). Thus, a strategic policy emerged about the need for a permanent title of security elements and missiles that are ready throughout the year to carry out anti-access tasks at Indonesia's strategic *choke points*. For this reason, of course, it must be supported by adequate resources, including the selection of ideal defense equipment at *each strategic choke point in Indonesia where each choke point has different characteristics*.

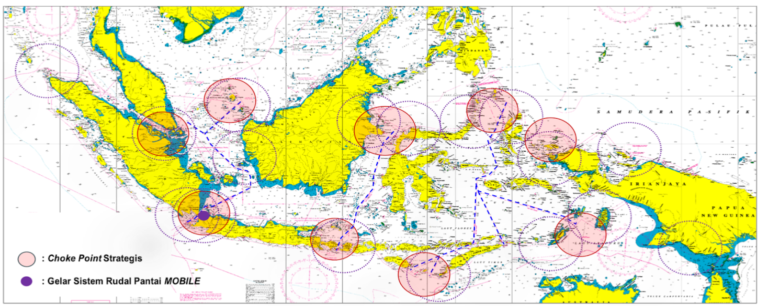

Figure 1. Nine *Choke Point* Strategic Indonesia

In fulfilling the needs of the available force to carry out the A2 / AD task, based on Presidential Regulation No. 66 of 2019 Article 63 paragraph 1 that this is one of the tasks of the Navy Marine Corps, namely organizing Coast Defense Operations (Ops Hantai) (Saputro et al., 2021). Furthermore, to support the task in coastal defense operations in this case in the *choke point region,* there are three types of *weapons systems* that are selected in carrying out the task, namely the Indian-made Brahmos II guided missile, the Ukrainian-made Neptune 360 ST Rocket System, and the Swedish-made RBS 15 MK 4 listed in table 1. All three weapon systems have relatively similar armament characteristics. However, the selection of weapon systems must be in accordance with the needs and adjust to the contours of the region and must consider foreign policy relations with producing countries to be one of the important components in making the right decision.

Table 1. Comparison of Three Hantai Missile Weapon Systems to Choose

Aspect	**Brahmos II**	**Neptune 360 ST Rocket System**	**RBS 15 MK 4**
Country	India	Ukraina	Swedia
Lenght & Diameter	8.40 M / 0.60 M	5.05 M / 0.40 M	4.35 M / 0.50 M
Width Span	-	1.30 M	1.40 M
Weight (With Boosters)	3.000 Kg	Ca 870 Kg	Ca 810 Kg
Seeker	*Active Radar Homing*	-	*Active Radar*
Speed	2,8 Mach	1000 – 1050 Km/H	0.9 Mach (Subsonic)
Range	290 Km	Up To 300 Km	>300 Km
Warhead	~200 Kg	~150 Kg	~200 Kg
Trajectory	3D *Waypoints*	3D *Waypoints*	*Multiple* 3D *Waypoints*
Navigation	INS, GPS/ GLONASS/ GAGAN *Satellite Guidance*	GPS and INS	*INS and Anti-Jam* GPS
Service Life	> 10 Years	10 Years	15 Years
Launch Platforms	*Aircraft, Ships and Trucks*	*Aircraft, Ships and Trucks*	*Aircraft, Ships and Trucks*
Interopability (C4ISR)	-	-	Siskom KRI
Price per unit	$ 14.000.000	$ 1.000.000	$ 4.285.000
Price 1 Baterai	8 Rudal Bhramos 1 MCP 2 MAL@ 2 Rudal 1 *Workshop Vehicle*	60 Rudal Neptune 1 MCP-360 1 USPL-360 1 R-360 TLC-360 (RK-360 item) 1 TLV-360 1 TV-360 1 SGE (1 Set /Rai = $ 4.160.000)	32 Rudal RBS 15 + 2 untuk uji 1 *Mobile* C3 *system* 4 Kendaraan Taktis Peluncur @ 4 Rudal 4 Kendaraan Pengangkut @ 4 Rudal
Total Price	$ 130.000.000	$ 67.200.000	$ 241.000.000

Sumber: Diolah dari Berbagai Sumber

In this article, the discussion of strategic decision making in the selection of the right and effective *Weapon System* in the A2 / AD (*Anti Access / Area Denial*) strategy at the Indonesian strategic choke point *is the main one based on relevant decision-making theories and using the* Analytical Hierarchy Process *(AHP*) methodology.

This article also limits the strategic *choke point* as the sample in this study is the Sunda Strait, which is a strait that separates the island of Java from the island of Sumatra. Then, the selection of the Sunda Strait as a sample was motivated by two things, namely the Decree of the Minister of Transportation of the Republic of Indonesia on May 29, 2020 concerning the Establishment of a Route System *in the Sunda Strait which stipulates a Traffic Separation Scheme* (TSS) in the Sunda Strait to improve shipping security and safety (Yulianto, 2022), and considering geographical conditions with a water area of 8,138 km2, with a northern width of ± 24km with a depth of ± 80m and a width of the southern part of ± 100km with a depth of ± 1575m (Danial et al., 2020). Thus, research is needed on the need for an ideal *weapon system* to be able to reach the entire waters in the Sunda Strait.

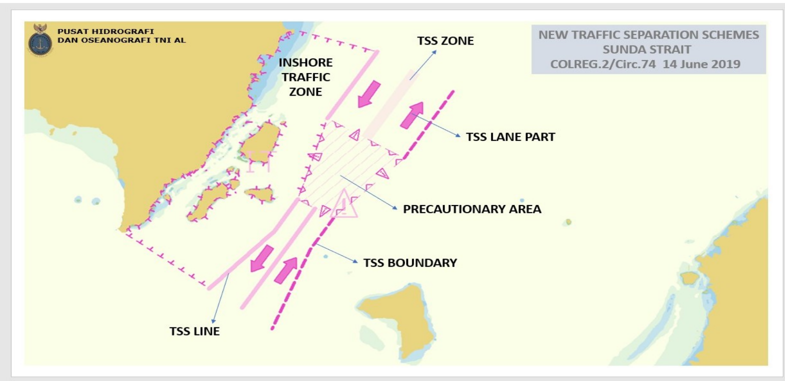

Figure 2. Traffic Separation Schemes (TSS) Selat Sunda (Kristiyono et al., 2021)

Furthermore, the discussion of this research is limited only to the decision-making process in the selection of *weapon systems* by considering several relevant factors and continued with the AHP method in prioritizing the main, second, and alternative criteria, each of which will be in the mathematical synthesis process by measuring consistency, namely the Consistency *Index* (CI), and *Consistency Ratio* (CR). Further, because of the analysis and conclusions, the final weight and ranking values will be presented in this article.

METHOD

Data Collection Methods

Studi Pustaka

In collecting relevant theories related to the problems in this article, the author conducts a literature study by studying research that has been done previously and studying references that have important information for this article.

Field Studies

Data collection through sources from previous journals, open sources, and using questionnaire methods to find initial data in determining the criteria needed. At the stage of collecting data regarding criteria information obtained from questionnaires through google form media with respondents from 30 *experts* in the field of defense in Indonesia.

In determining the main criteria, respondents were asked to choose 3 main criteria. After the 3 main criteria are selected, the respondent selects and determines 3 sub-criteria each of the 3 main criteria and alternative weapon systems related to the criteria that the respondent has determined.

Data Processing Methods

After collecting data from the questionnaire, the data processing stage is then carried out to obtain paired comparison values where these values will be processed using the *Analytical Hierarchy Process* (AHP) method for decision making support systems in choosing ideal and effective weapons at Indonesia's *strategic* Choke Point.

RESULTS AND DISCUSSION

Based on the analysis in the previous section, the following are the results of the analysis on the hierarchical structure as presented in figure 6 below.

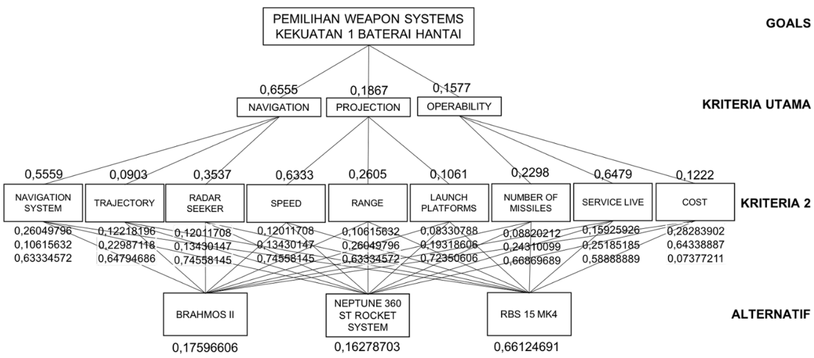

Figure 3. Results of Analysis on Hierarchical Structure Using *Analytical Hierarchy Process* (AHP) Method

Determining the Final Weight Value of the Criterion

The results of the AHP analysis shown in table 18 show the weight values for each criterion and the final weight because of the multiplication of each weight value from level I, level II and level III. Level I is the weighted value of the main criteria, namely *Navigation* 66%, *Projection* 19%, and *Operability* 16% according to table 2.

At level 2, the order of each sub-criterion of the main criteria of *Navigation* is obtained namely *navigation system* 56%, *trajectory* 9%, *radar seeker* 35% as shown in table 6. The sub-criteria of the main Projection criteria *are* speed *63%,* range *26%,* launch platforms 11% are shown in table 7. And the sub-criteria of the main criteria of *Operability* are *number of missiles* 23%, *service life* 65%, and *cost* 12% according to table 1. While level III is the weight value of the Alternative criteria with the Main Criteria and Sub Criteria displayed in table 2 to table 3.

Furthermore, to find out the final weight is by multiplying the value in the main criteria weight column multiplied by the value in the subcriteria weight column multiplied by the value in the alternate weight column, it will produce the value in the final weight column as shown in table 2.

Bobot akhir = Bobot level 1 x Bobot level 2 x Bobot level 3

Table 2. Final Weight Criteria

THE WEIGHT OF EACH LEVEL						FINAL WEIGHT
LEVEL 1		LEVEL 2		LEVEL 3		
MAIN CRITERIA	WEIGHT	SECOND CRITERION	WEIGHT	ALTERNATIVE	WEIGHT	
NAVIGATION	0.655486542	Navigation system	0.555926916	BRAHMOS II	0.260497956	0.094926136
				NEPTUNE 360 S	0.106156324	0.038683642
				RBS15 MK4	0.63334572	0.230792835
		Trajectory	0.09035205	BRAHMOS II	0.122181965	0.007236172
				NEPTUNE 360 S	0.229871176	0.013614018
				RBS15 MK4	0.64794686	0.038374363
		Radar seeker	0.353721034	BRAHMOS II	0.120117078	0.027850271
				NEPTUNE 360 S	0.134301475	0.031139056
				RBS15 MK4	0.745581448	0.17287005
PROJECTION	0.186749482	Speed	0.63334572	BRAHMOS II	0.120117078	0.014207086
				NEPTUNE 360 S	0.134301475	0.015884774
				RBS15 MK4	0.745581448	0.088185126
		Range	0.260497956	BRAHMOS II	0.106156324	0.005164278
				NEPTUNE 360 S	0.260497956	0.012672668

				RBS15 MK4	0.63334572	0.030810913
		Launch Platforms	0.106156324	BRAHMOS II	0.083307883	0.001651549
				NEPTUNE 360 S	0.19318606	0.003829844
				RBS15 MK4	0.723506057	0.014343246
OPERABIITY	0.157763975	Number of Missiles	0.229871176	BRAHMOS II	0.08820212	0.003198684
				NEPTUNE 360 S	0.243100985	0.008816152
				RBS15 MK4	0.668696895	0.024250554
		Service life	0.64794686	BRAHMOS II	0.159259259	0.016279907
				NEPTUNE 360 S	0.251851852	0.025744969
				RBS15 MK4	0.588888889	0.060197796
		Cost	0.122181965	BRAHMOS II	0.28283902	0.00545198
				NEPTUNE 360 S	0.64338887	0.012401907
				RBS15 MK4	0.07377211	0.001422025

Source: Processed by Author

CONCLUSION

In the decision-making theory of Harold Koontz and Cyril O'Donnell, choosing between two or more options is essential for careful planning, such as in data analysis regarding the percentage of selection of three types of *Weapon Systems* that are appropriate and effective faced with the contours of Indonesia's geographical area and *other operational requirements*. The analysis used the *Analytical Hierarchy Process* (AHP) method by Thomas L. Saaty with final weighting with *Simple Additive Weighting* (SAW) so that the ranking of the three weapon *systems* was found from the sum of the final weight of each *weapon system*.

Next, the ranking is determined by summing the final weight values of each *weapon system* on each key criterion as shown in table 2. For *weapon systems,* Brahmos II scored on the main criteria:

Navigation:	0,094926136 + 0,007236172 + 0,027850271	= 0,130012579
Projection:	0,014207086 + 0,005164278 + 0,001651549	= 0,021022912

Operability:	0,003198684 + 0,016279907 + 0,00545198	= 0,024930572
	Total	= 0,17596606

For *weapon systems*, the Neptune 360 ST scored the total final weight on key criteria:

Navigation:	0,038683642 + 0,013614018 + 0,031139056	= 0,08343672
Projection:	0,015884774 + 0,012672668 + 0,003829844	= 0,032387285
Operability:	0,008816152 + 0,025744969 + 0,012401907	= 0,046963029
	Total	= 0,16278703

For *weapon systems*, the RBS15 MK4 scores the total final weight on the main criteria:

Navigation:	0,230792835 + 0,038374363 + 0,17287005	= 0,442037248
Projection:	0,088185126+ 0,030810913+ 0,014343246	= 0,133339285
Operability:	0,024250554 + 0,060197796 + 0,001422025	= 0,085870375
	Total	= 0,66124691

From the results of the analysis, it can be concluded that the selection of *weapon systems* from the three available units can be sorted by rank are (1) RBS 15 MK4 (66%), (2) Brahmos II (18%), and (3) Neptune 360 ST (16%) as shown in table 19. So that the choice of the best weapon system *based on the selection of the AHP method fell to the RBS 15 MK4 weapon system made in Sweden*.

Table 3. Weapon System Rating After Analyst Using *Analytical Hierarchy Process* (AHP) Method

Weapon Systems	Bobot	Persentase	Rank
RBS 15 MK4	0,66124691	66%	1
BRAHMOS II	0,17596606	18%	2
NEPTUNE 360 ST	0,16278703	16%	3

Source: Processed by Author

However, it is important to note that the implementation of A2/AD must consider other aspects such as diplomatic and economic aspects so as not to excessively disrupt maritime trade routes, which can have a negative impact on the Indonesian economy. In addition, the geographical contours *of each strategic choke point have their own uniqueness, so the selection of weapon systems at each choke point must be analyzed in accordance with* operational requirements. Therefore, in addition to careful strategic planning, multilateral cooperation can help maintain the necessary balance between defense aspects and economic growth in the region.

REFERENCE

Danial, D., Sitamala, A., & Belardo, B. (2020). Keamanan Dan Pertahanan Di Selat Sunda, Studi Alur Laut Kepulauan Indonesia. *Jurnal Idea Hukum*, *6*(1).

Dobija, K. (2021). The Political and Military Aspects of Creating Anti-Access/Area-Denial Systems (A2/Ad): The Example of China and Russia. *Safety & Defense*, *2*, 22–39.

Kristiyono, K., Maarif, S., & Madjid, M. A. (2021). Peran Nyata Pusat Hidro-Oseanografi Tni Angkatan Laut Dalam Penanggulangan Bencana. *Jurnal Pertahanan Dan Bela Negara*, *11*(1), 81–92.

Peraturan.go.id. (2023). *Peraturan Menteri Pertahanan Nomor 14 Tahun 2023 Tentang Strategi Pertahanan Negara*.

Russell, A. L. (2017). *Strategic A2/AD in Cyberspace*. Cambridge University Press.

Saputro, R. D., Ibrahim, A. L., & Abimanyu, A. (2021). Pemutakhiran Peta Tematik Pendaratan Menggunakan Perangkat Lunak CARIS PCC 2.15: Updating Landing Thematic Map Using CARIS PCC 2.15 Software. *Jurnal Hidropilar*, *7*(2), 155–166.

Satriananda, A. J., & Manfaat, I. D. (n.d.). *Studi Pengembangan Desain Kapal Frigate Jenis Mrlf Sebagai Infrastruktur Pertahanan Laut Di Indonesia Khususnya Wilayah Perairan Natuna*.

Yulianto, Y. (2022). Hak Lintas Damai Berdasarkan United Nation Convention On The Law Of The Sea (UNCLOS) 1982 dan Keputusan Menteri Perhubungan Nomor Km 130 Tahun 2020 Tentang Penetapan Sistem Rute di Selat Sunda. *Jurnal Universal Technic*, *1*(1), 95–105.